

DOE OFFICE OF INDIAN ENERGY

Pathways to Alaska Native Village Energy Development

Alaska Native Villages Renewable Energy and Energy Efficiency
Workshop

Anchorage, Alaska October 16, 2012



U.S. DEPARTMENT OF
ENERGY

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Why Complete a Renewable Energy Project?

Reduce use of diesel and heating oil

Jobs

Experience

Cost savings

Cost stabilization

Energy reliability

Self reliance

Environmental sustainability

*Benefits vary based on the
type and scale of projects*

Key Challenges

- Cost to build, lack of scale
- Funding and financing
- Renewable resources stranded
- Regional Grid / Micro grid design and integration, transmission technology
- Disaggregate village/regional approach to energy development
- Education, capacity building, and sustainability at the village level

The Pathway – How do We Overcome Obstacles to Achieve our Energy Goals

Begin with a plan

Creates motivation and objectives to keep going

Promotes persistence

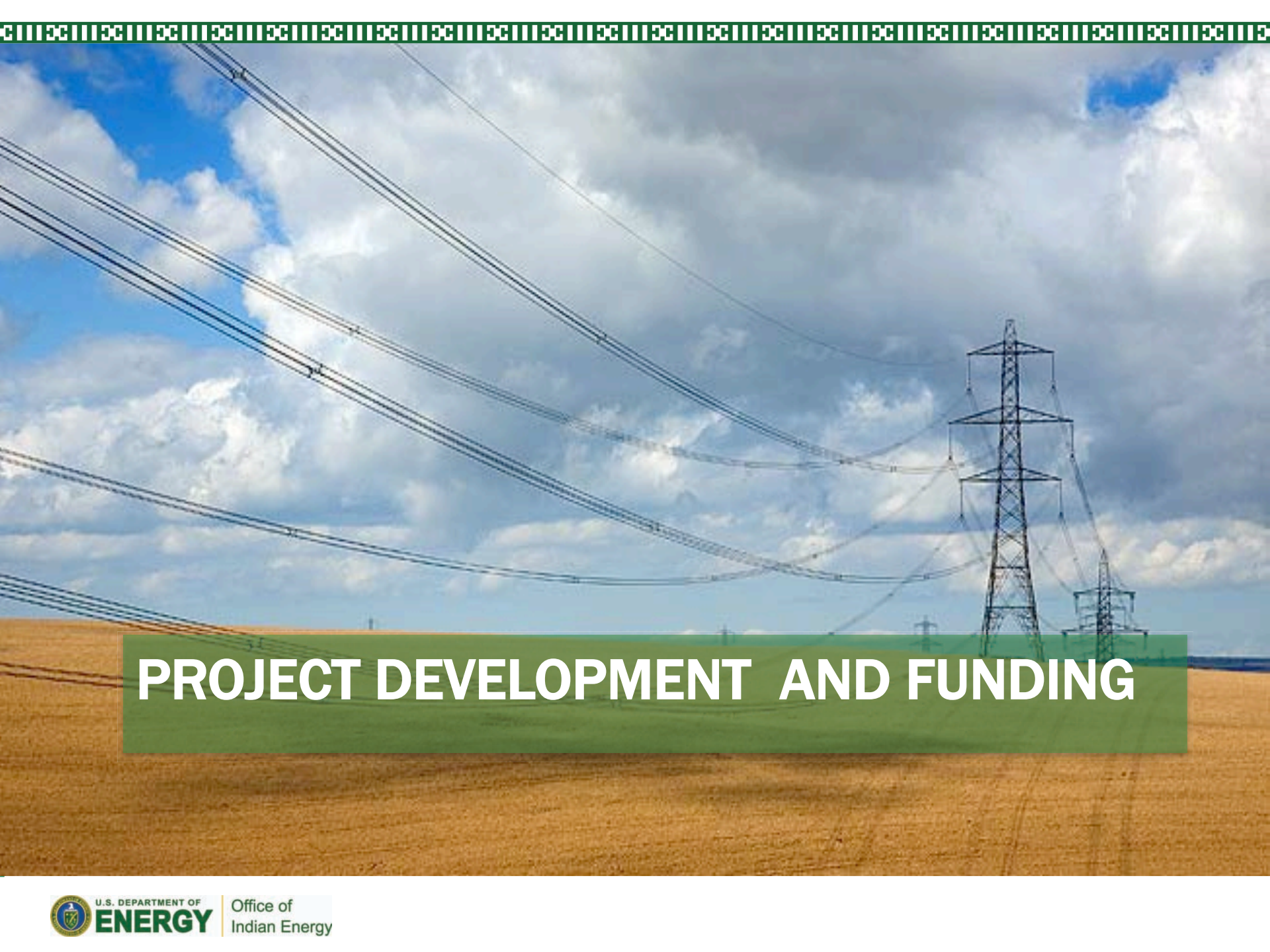
Identifies key projects and opportunities

Establishes a touchstone for future decisions

Energy Planning Model

Nine Step Process:

- Step 1: Identify and convene stakeholders
- Step 2: Establish a leadership team
- Step 3: Develop a common energy vision
- Step 4: Develop a community energy baseline
- Step 5: Develop energy goals
- Step 6: Identify and evaluate program and project resource options
- Step 7: Find and secure funding sources
- Step 8: Compile the Plan
- Step 9: Measure and evaluate



PROJECT DEVELOPMENT AND FUNDING



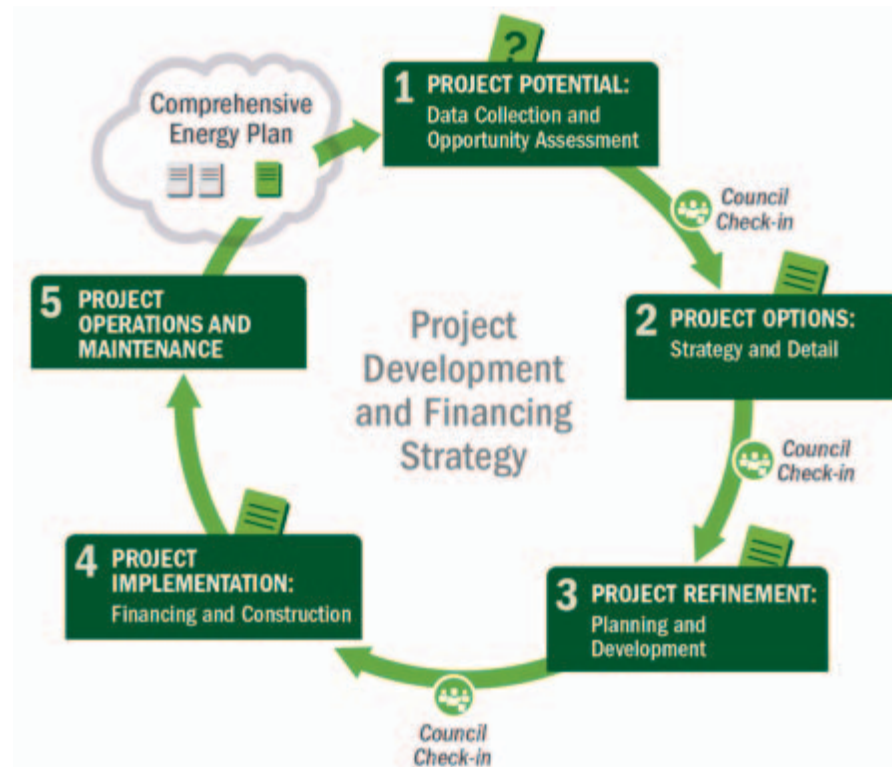
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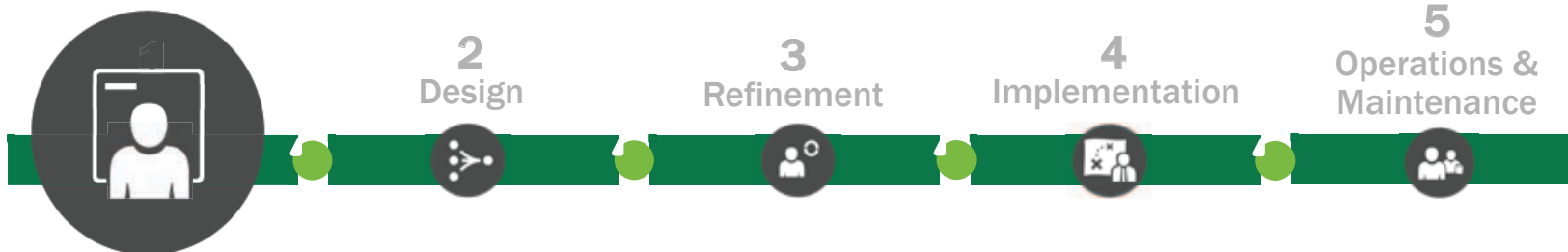
Project Development Process: What is it?

- Framework based on experience
- Decision-point based
- Project development is iterative
- Delaying or deciding against a project that does not meet current goals is a viable outcome and option



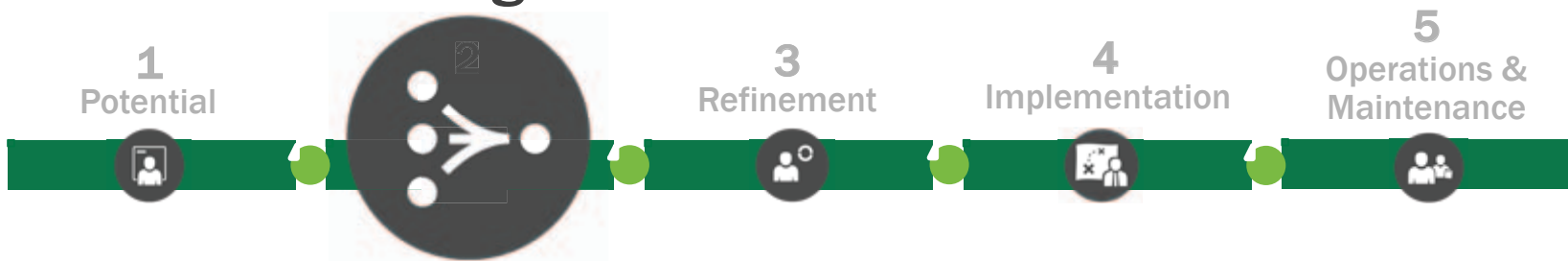


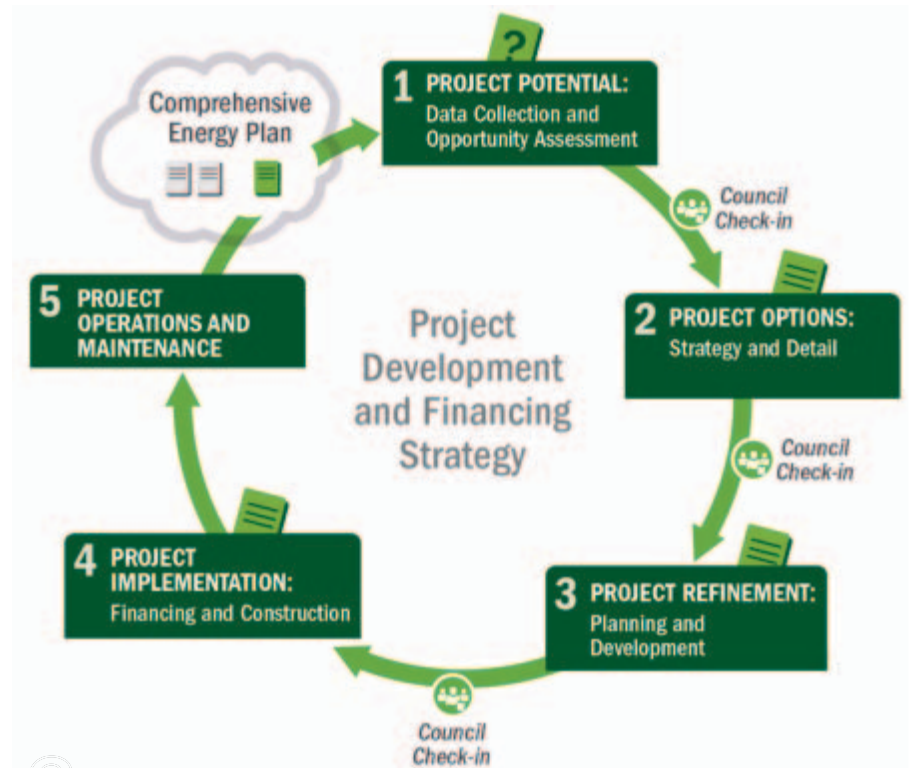
1 Potential



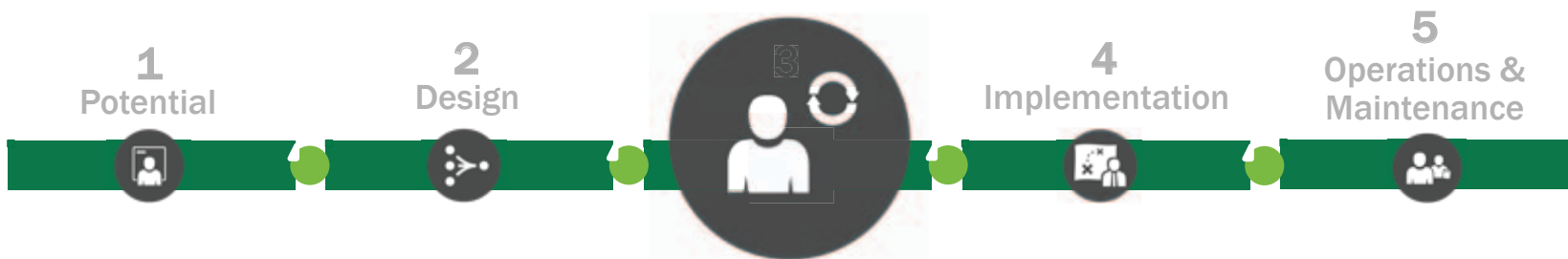


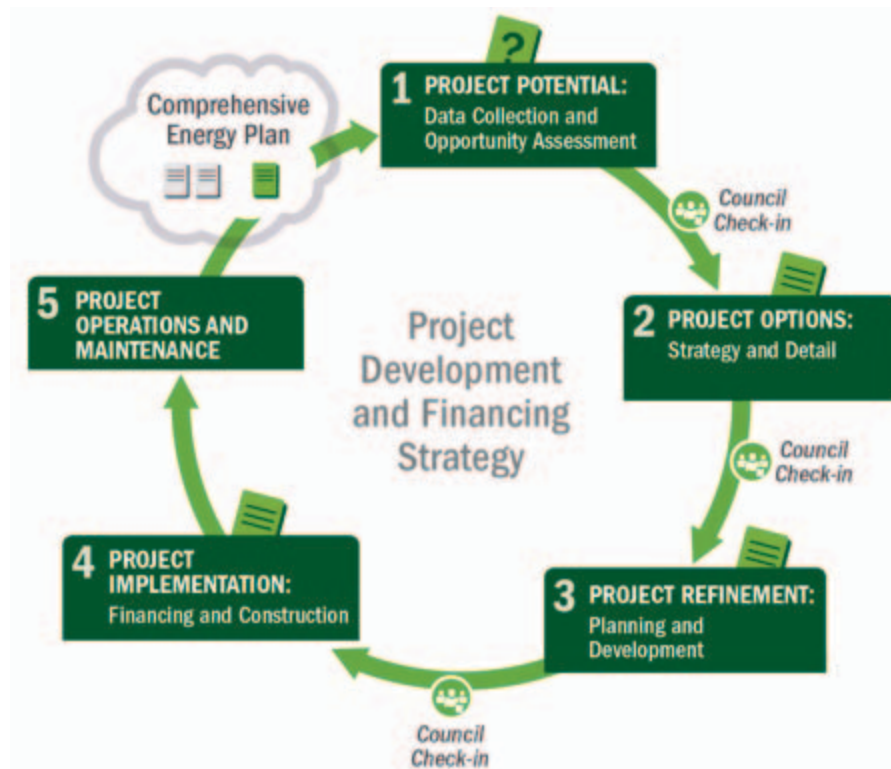
2 Design



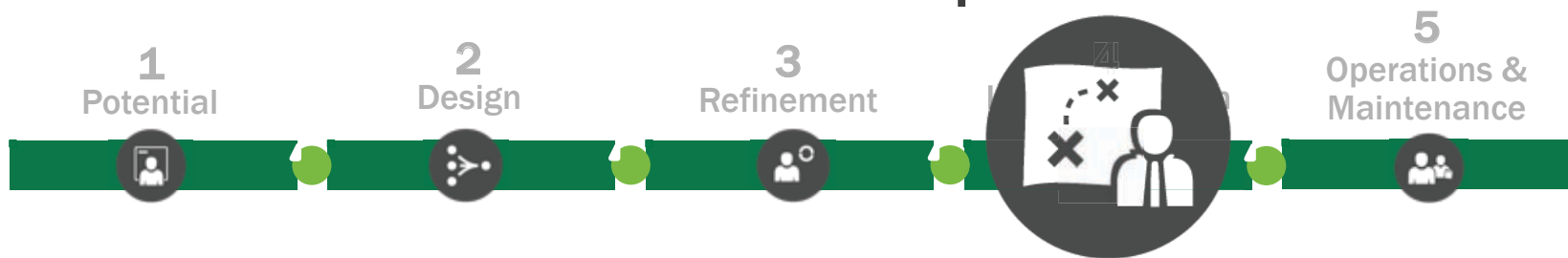


3 Refinement





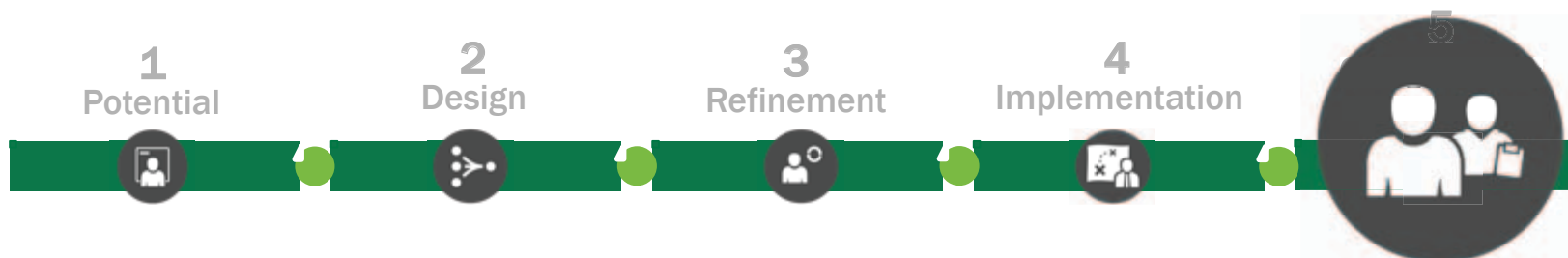
4 Implementation





5

Operations & Maintenance



Summary of Actions by Step



Step 1: Gather all relevant data in order to make first pass at potential project

Step 2: Estimate value to Tribe, begin to identify potential partners, vendors, understand technical sustainability requirements

Step 3: Finalize economic assumptions, technology selection

Step 4: Financial close and construction; vendor contracting completion; project commercially delivered

Step 5: Maintenance plan implementation

Celebrate!

Step 1: Project Potential



Gather all relevant data in order to make an educated decision about pursuing projects:

- Energy resources
- Technology options
- Possible sites for project locations
- Electric and heat cost data

Step 1: Decisions



Major Decision:

Proceed with
in-depth project
analysis or abandon/
change project?

Decisions:

Inputs:

Why do a project?

Project Goal

Powers Users

What is the energy
environment?

Energy Context

Energy Costs

What would a
project look like?

Site Options

Resource Options

Technology Options & Costs

What is the
Tribe's role?

Role Options

Tribal Resources

Development	<ul style="list-style-type: none"> •Concept and scoping •Power pricing •Access to power markets (adequacy and availability of transmission)
Site	<ul style="list-style-type: none"> •Site control •NIMBY/BANANA
Permitting	<ul style="list-style-type: none"> •Environmental studies •Archaeological, historical, cultural significance •Federal Aviation Administration restrictions
Finance	<ul style="list-style-type: none"> •Capital availability •Credit-worthy offtaker •Incentive availability risk and regulatory risk
Construction/Completion	<ul style="list-style-type: none"> •Engineering, procurement, and construction difficulties •Cost overruns •Schedule
Operating	<ul style="list-style-type: none"> •Output shortfall •Technology O&M •Transmission/curtailment

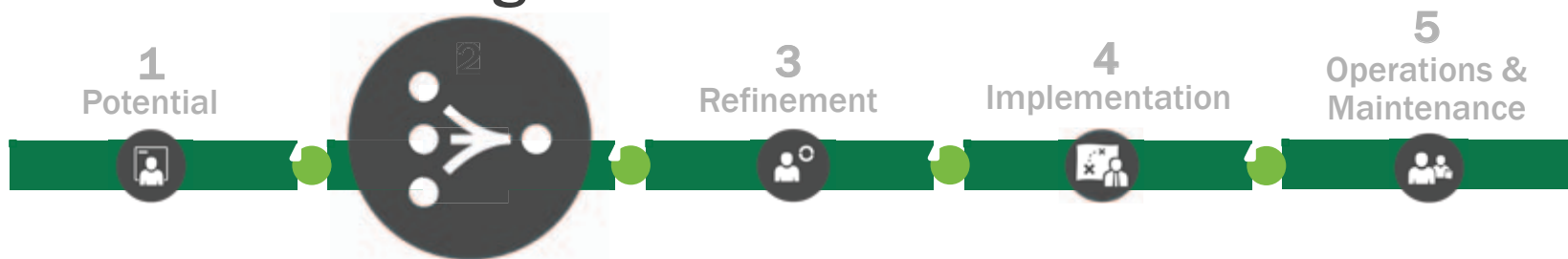
Step 1: Outputs



- ✓ Project Scale
- ✓ Resource and Market Context
- ✓ Savings/Production Potential
- ✓ Preliminary Sites Options



2 Design



Step 2: Strategy and Detail



- Identify technology and start procurement process
- Identify financing options
- Estimate potential value to the Tribe
- Initiate necessary permits
- Determine whether development on specific project concepts should be stopped

Step 2: Decisions



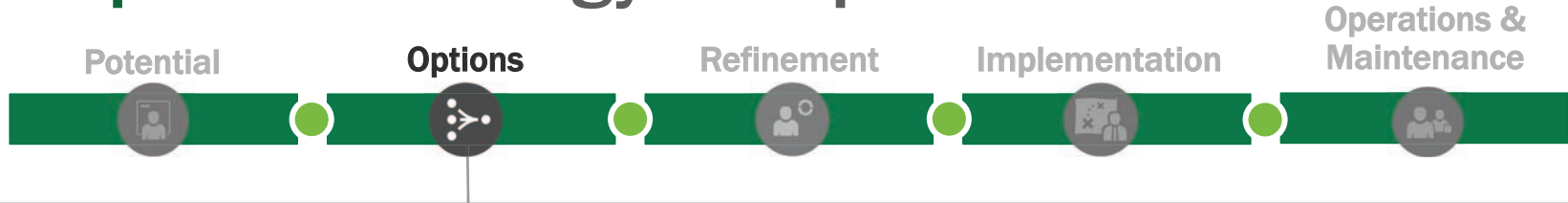
Major Decision:

**Pursue development
of specific project?**

Supporting decisions:

- Determine specific technology options
- Set aside land for project development
- Pursue partnership or funding

Step 2: Technology Comparisons



Technology Characteristics

- Output (over time)
- Initial Cost
- Operation and Maintenance Cost
- Land use per output
- Commercially available

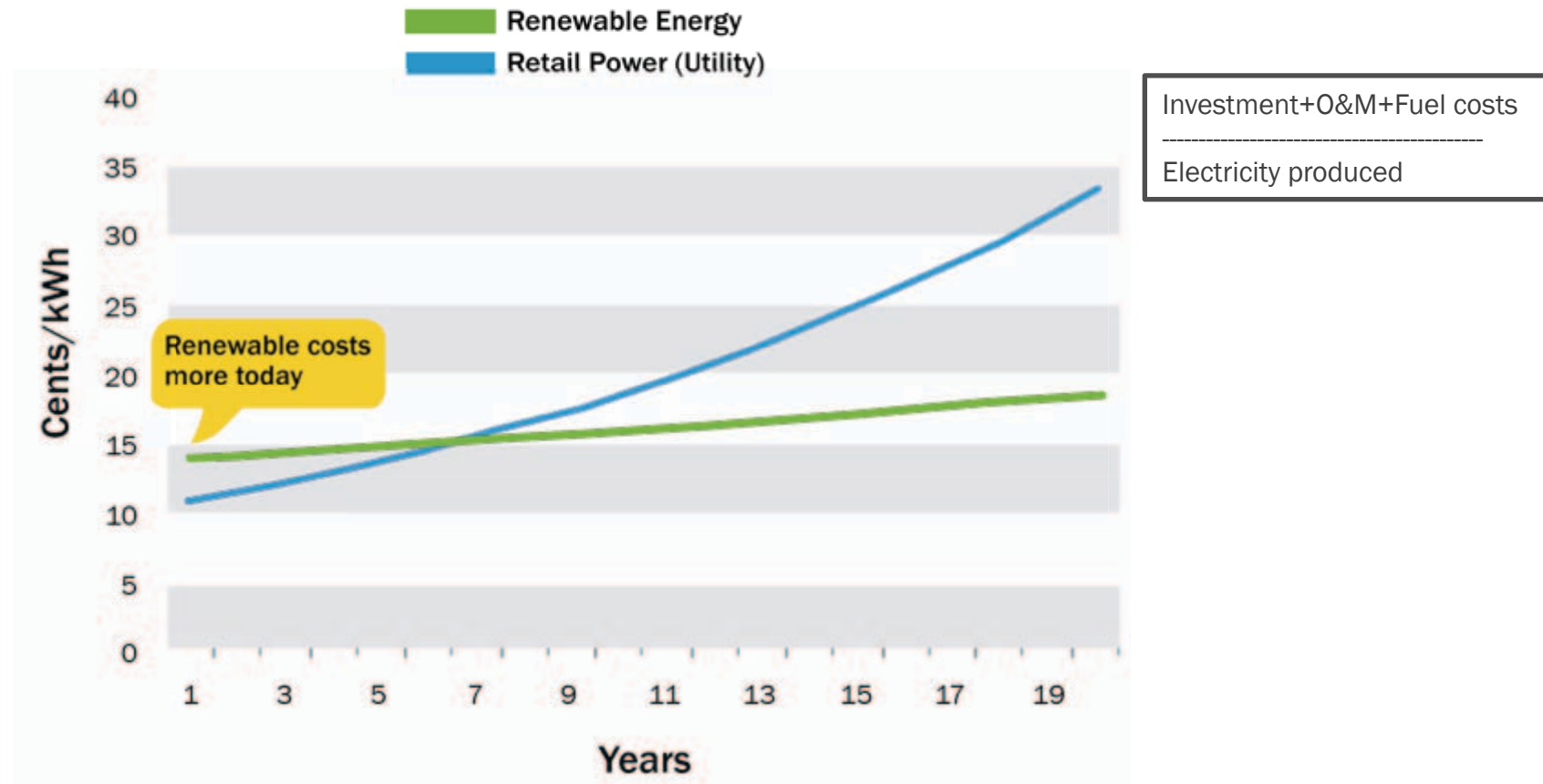
Key Concept: Levelized Cost of Energy (LCOE)



- Calculates present value of total cost of building and operating a power plant over an assumed life cycle, expressed in real dollars to remove the impact of inflation
- Allows the comparison of different technologies (i.e. wind, solar, natural gas, diesel) of unequal life spans, different capital cost, risk, return, and capacities
- Critical to making an informed decision to proceed with development of facility-, community-, or commercial-scale project

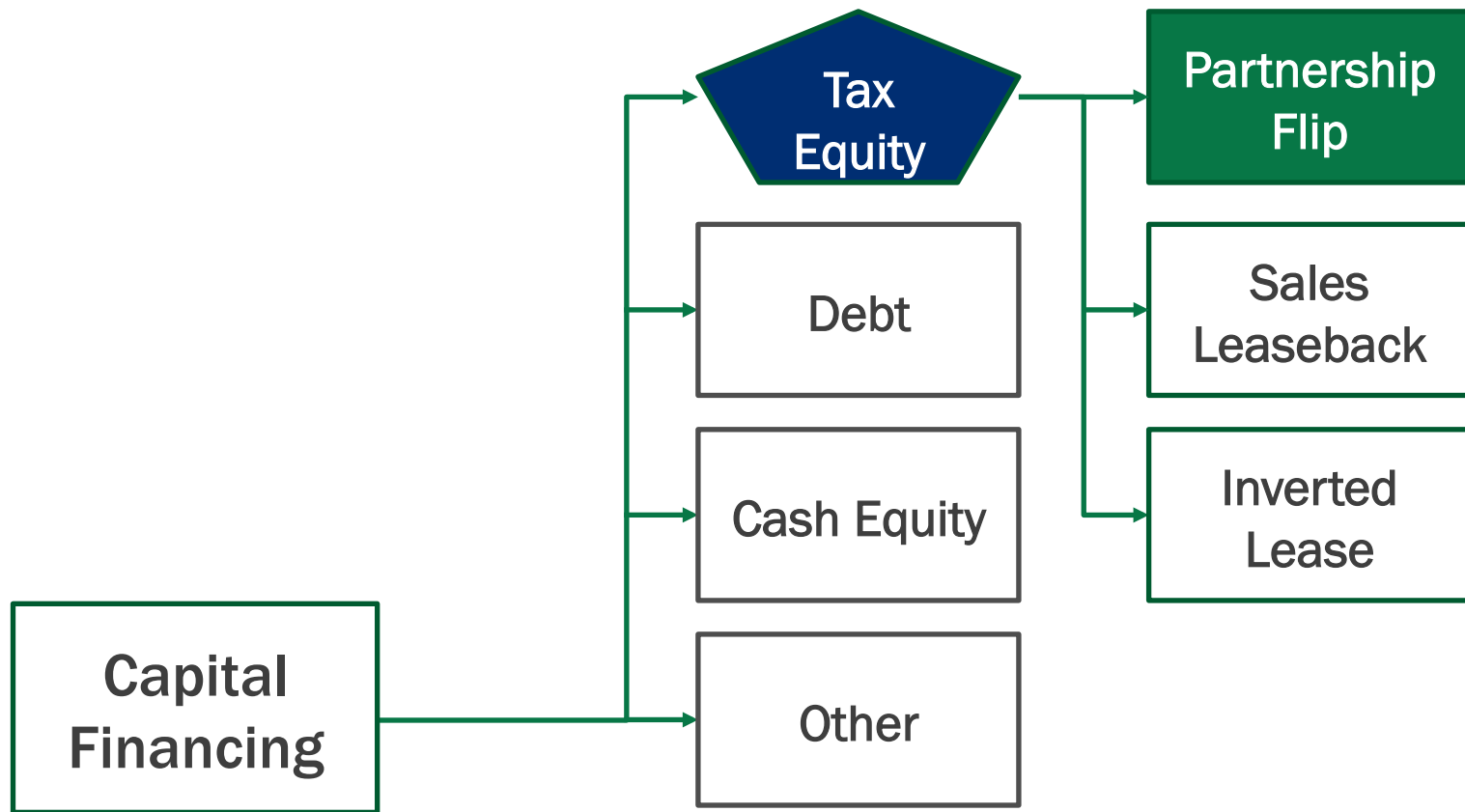
Key Concept: Levelized Cost of Energy (LCOE)

Cost of Energy Comparison (constant demand)

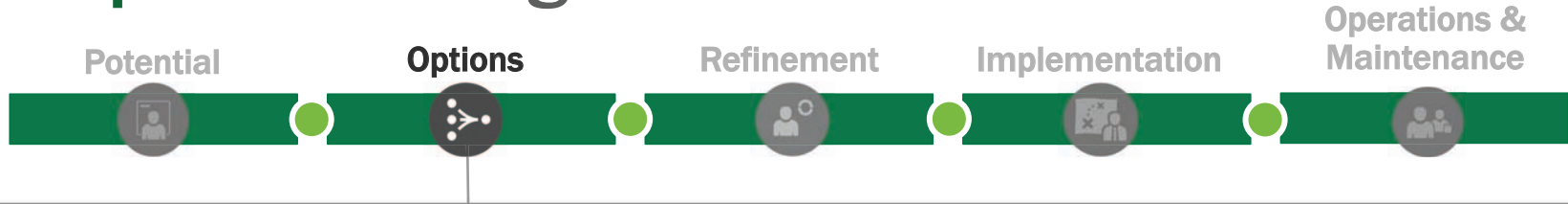


Renewable has a lower LCOE, compared to retail LCOE. How much lower depends on project specifics.

Project Finance Options



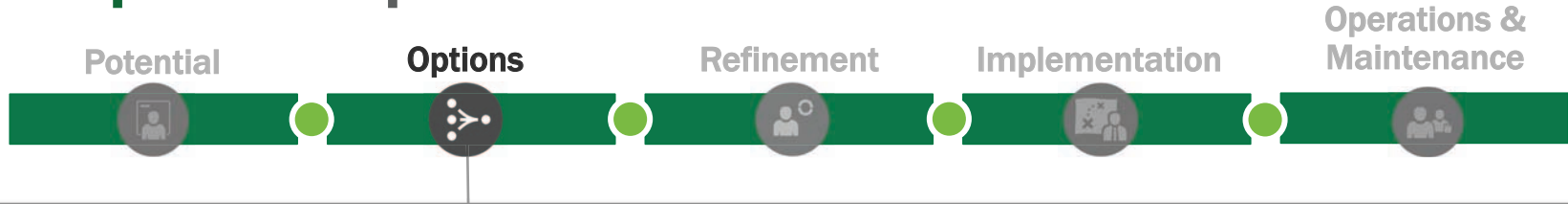
Step 2: Initiating Permits



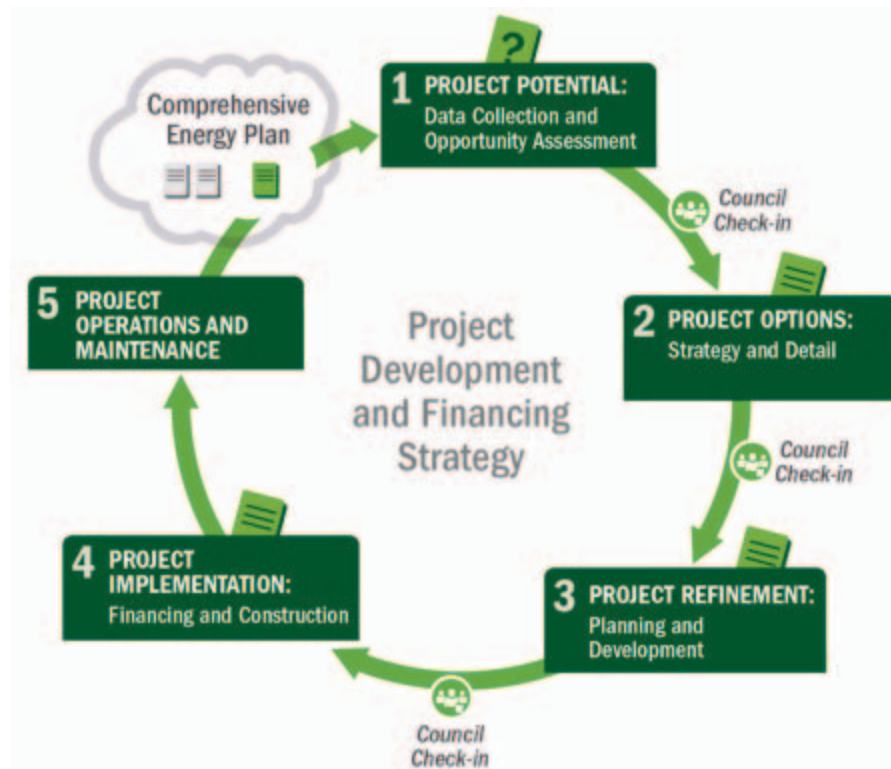
- Identify necessary permits, varying by scale
- Can be local, state, federal
- Can be costly and time intensive

Scale specific courses offer detail on permit types

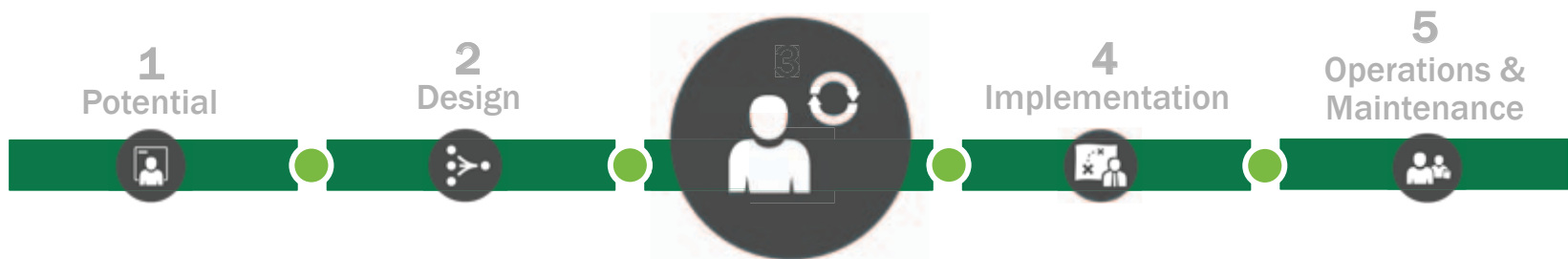
Step 2: Outputs



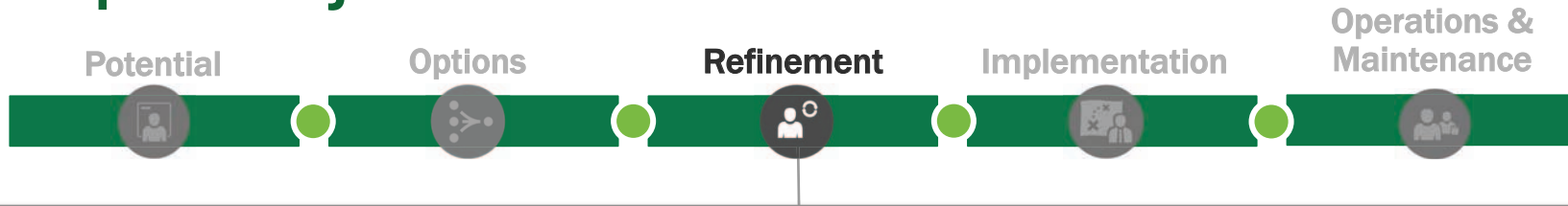
- ✓ Decision on resource type
- ✓ Decision on ownership structure
- ✓ Understanding the permit needs and process
- ✓ Narrowing of technology options



3 Refinement



Step 3: Project Refinement



Purpose: Financing Design, Vendors, Environmental Reviews, and Finalizing the Off Take Agreement

Tasks

- Finalize Permitting (including environmental reviews), interconnection
- Finalize Technology, financing, and development costs

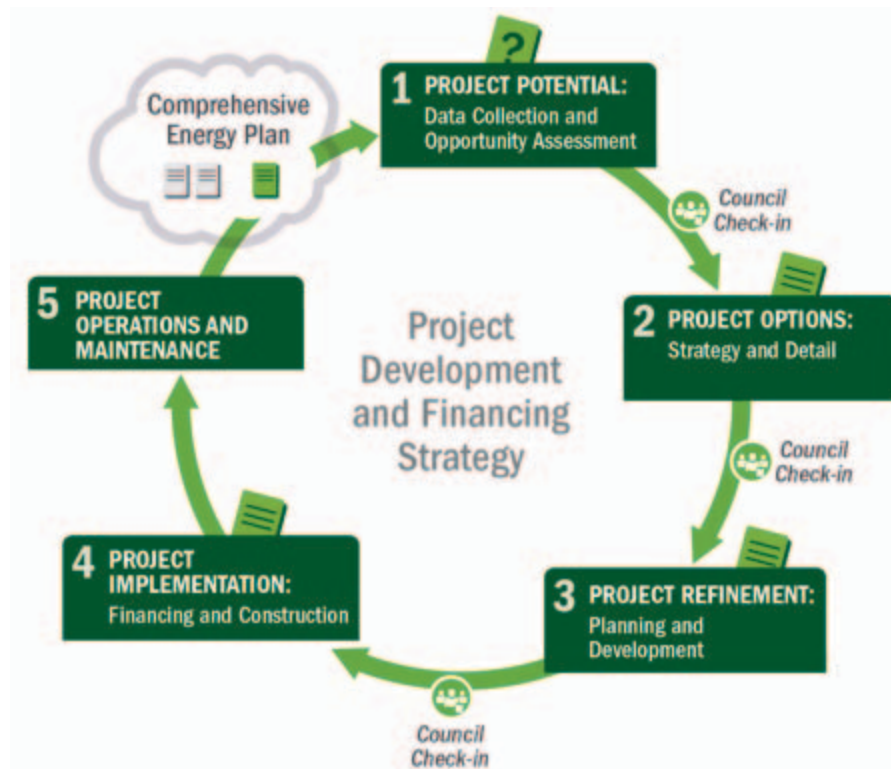
Outputs

- Proposed financing/commitments and organization structure
- Detailed economic models
- Vendors selected
- Completed environmental reviews and finalized permits
- Offtake and transmission/interconnection agreement

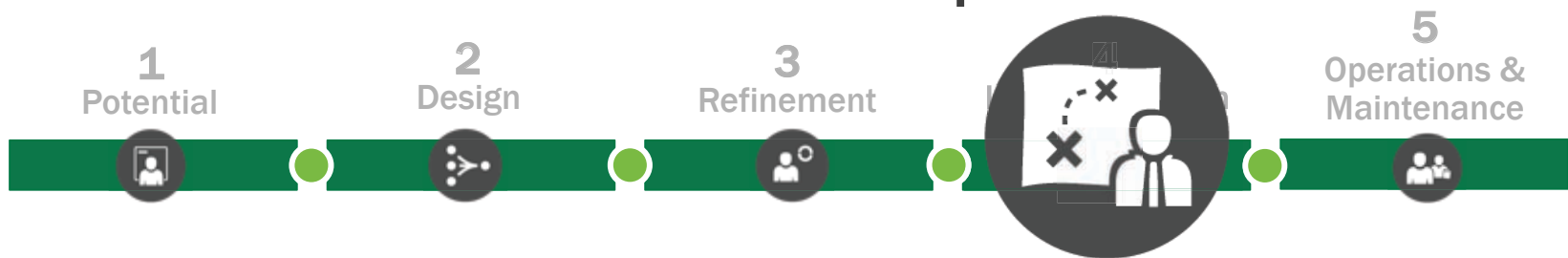
Key Concept: Project Team



- Project team includes everyone in project development, construction, and operations
- Can include people involved in planning process
- Skills needed:
 - Project management, legal, financial, technical



4 Implementation



Step 4: Implementation



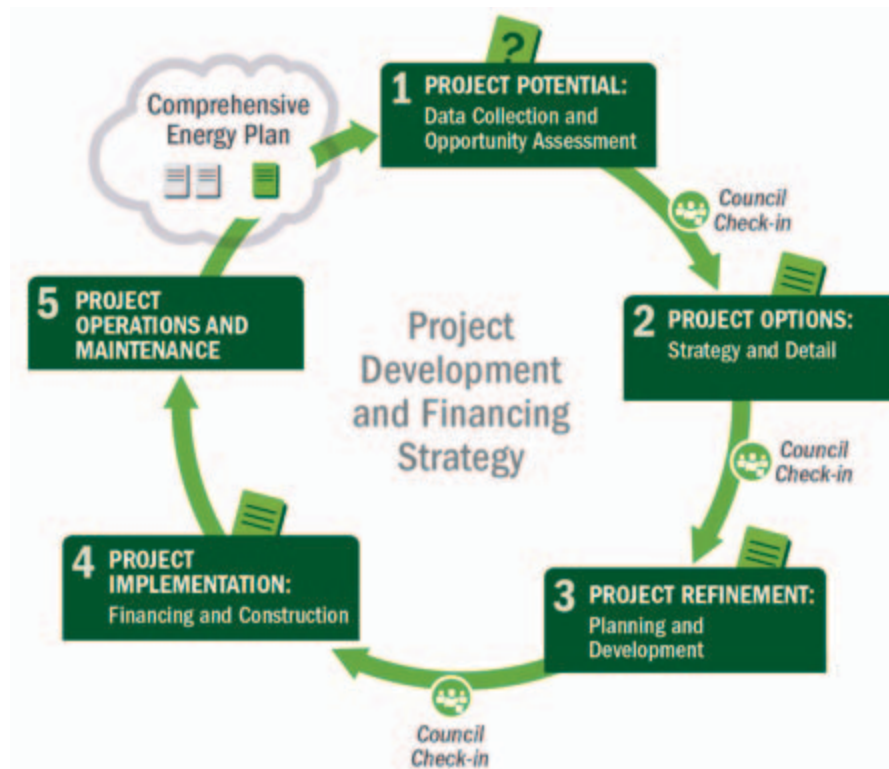
Purpose: Complete physical construction of project

Tasks:

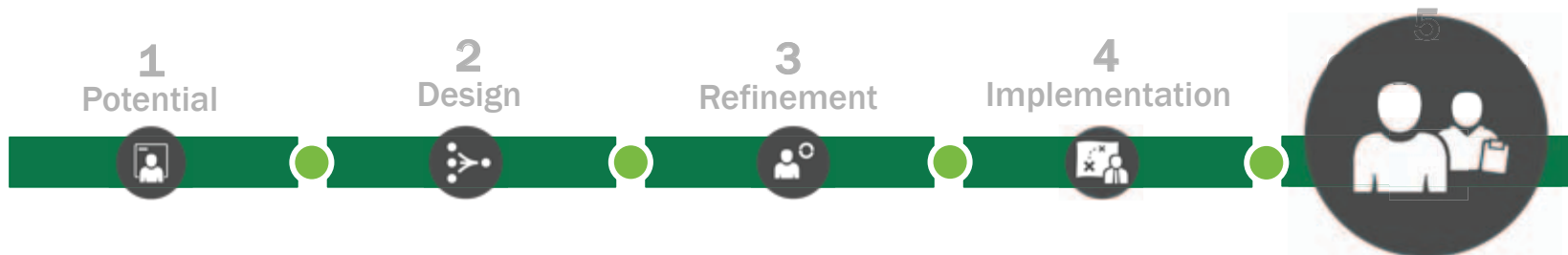
- Finalize vendor contracting process
- Finalize pre-construction tasks
- Complete construction and equipment installation
- Commission project leading to commercial operations

Output:

- Completed Project (commercial operation)



5 Operations & Maintenance



Step 5: Operations and Maintenance



Purpose: Implement operations and maintenance plan (contract or self)

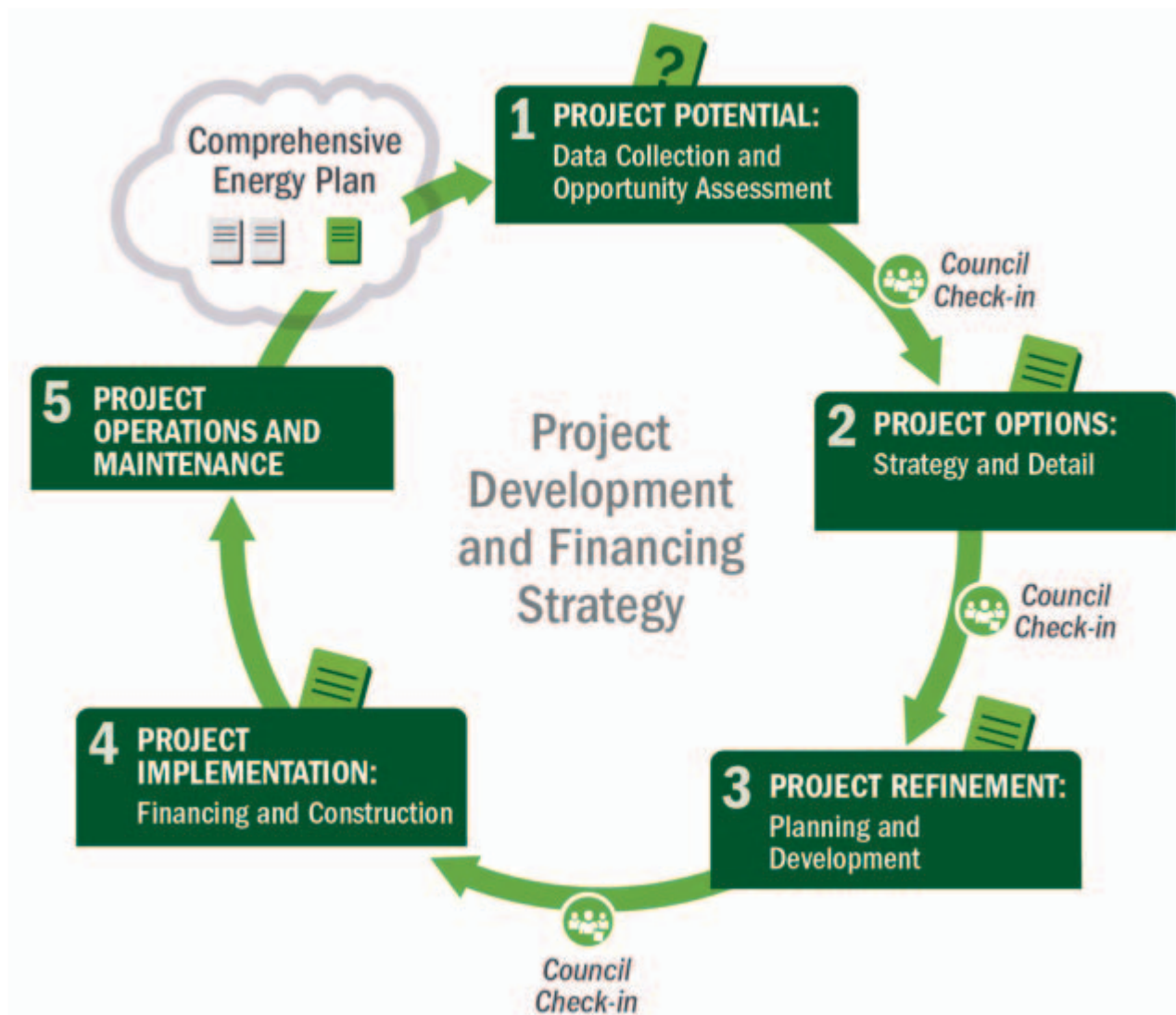
O & M Costs:

- Equipment maintenance and upkeep
- Inverter replacement
- Insurance
- Labor and staffing
- Extended warranty agreements



Photo by NREL/PIX 14952

Wrap Up: Project Development Process



Next?

- Check back in with planning document – update as necessary
- Identify next potential project from plan